his own measures the estimates of the mean heights of the continents and islands, given by other investigators, to draw a hypsometric curve, and to deduce the mean level of the solid crust, which he finds to be 2,440 meters below sea level. The paper is full of tables giving much information of the kind mentioned above and will be very useful to those interested in this line of earth science.

HARRY FIELDING REID

A MANUAL OF MAP PROJECTION

C. H. DEETZ AND O. S. ADAMS. **Elements of Map Projection with Applications to Map and Chart Construction.** 163 pp.; maps, diagrs., index. *U. S. Coast and Geodetic Survey Special Publ. No. 68*, Washington, D. C., 1921. 50 cents. 11½ x 7½ inches.

This is, primarily, a working manual on map projections. Part I deals with the theory involved in representing a curved surface on a plane and explains in simple language the underlying principles of several of the more common projections. Part II deals with the practical construction of these projections and includes detailed instructions as well as the necessary tables, in most cases. The mathematical development of a few of the projections is given for the benefit of those who may wish to see how the formulae are derived; but otherwise the entire book is of an elementary nature and does not require a knowledge of higher mathematics for a full appreciation of its contents.

In Part II the following projections are treated in separate chapters: Polyconic, Bonne, Lambert zenithal equal-area, Lambert conformal conic, Albers conical equal-area, Mercator, and gnomonic. In addition, there is a chapter on world maps where various other projections are treated including the stereographic, Aitoff equal-area, Mollweide homalographic, Goode's homalographic (interrupted), Guyou's doubly periodic, and others. A comparison of several of these projections as regards the amount and location of the maximum distortion shown by illustration in the frontispiece.

The chapter on the polyconic projection includes a discussion of the transverse polyconic projection and the polyconic projection with two standard meridians as used for the International map of the world (tables for the polyconic projection are given in *U. S. Coast and Geodetic Survey Special Publication No. 5*).

Considerable interest attaches to the chapter on the Lambert conformal conic projection on account of the uses made of this projection during the World War. For a small country like France the projection is an ideal one on which to superimpose a grid or quadrillage system. For larger countries, such as the United States, the distortion of this projection becomes too great for military purposes, and some other projection or device must be used. The solution of this problem for the United States is explained in the chapter entitled "The Grid System of Military Mapping."

In many ways the best projection for a general base map of the United States or other large countries with a predominating east and west dimension, is the Albers conical equal-area projection, on account of the small scale distortion and because of other desirable properties. As explained in the chapter on this projection, it is very easy to construct, requiring only good judgment in the selection of the standard parallels.

Navigators will be especially interested in the chapter on the Mercator projection which includes Mercator tables. Considering the extensive use of this projection for charts, it deserves to be better understood and appreciated than is the case at present. The chapter on the gnomonic projection will also appeal to navigators on account of the special properties of this projection, which make it so useful as an adjunct to certain sailing charts and for charts on which to plot radio-compass bearings.

C. H. SWICK

DANISH RAINFALL MAPS

KURT LEHMANN-TEGEL. **Regenkarten des Königreichs Dänemark.** 26 pp.; maps, diagrs., bibliogr. Dietrich Reimer (Ernst Vohsen), Berlin, 1919. M. 6. 12½ x 9½ inches.

Denmark is a small country, but with its irregular coast line, its numerous bays and peninsulas, and its outlying islands it presents, within a limited area, a considerable variety of climatic conditions. The new rainfall maps are based on observations at about 200 stations. The basic period is 1876–1915. Reductions to the uniform period, together with certain interpolations, have been made. The isohyets on the mean annual map are

drawn for 50-millimeter intervals, except that in districts of less than 550 millimeters of rainfall no isohyets are drawn. The scale of this map is 1 : 1,000,000. Topography is not indicated. The heaviest rainfall occurs in the western portion of the peninsula and is shown to be 750–800 millimeters (about 30 inches). Topography is, in these cases, an obvious control. In the southern part of Jutland three west-east rainfall zones may be distinguished. The first, on the west coast, has dominant general storm rains. The second, inland, receives its rainfall from barometric depressions as well as from summer thunderstorms, the latter predominating, while the former become less and less important toward the east. The third zone, on the east coast, has a further decrease of general storm rains and also a decrease of thunderstorm rains. It is an interesting fact that these changes in the type of rainfall occur over so limited an area. A decrease in rainfall towards the north is also shown. The smallest amounts are slightly less than 20 inches, i.e. roughly equivalent to the mean annual rainfall along the 100th meridian in the United States.

The twelve monthly maps are on a scale of 3 : 1,000,000, with isohyets for every 10 millimeters. August is the rainiest month for most of Denmark. October brings a secondary maximum. Continental and marine tendencies are thus both indicated. Autumn rains are characteristic of the west coast. The August maximum is found over the interior.

<div style="text-align: right">R. DeC. WARD</div>

A BIOGRAPHY OF DE SAUSSURE

D. W. FRESHFIELD. **The Life of Horace Benedict de Saussure.** xii and 479 pp.; maps, ills., bibliogr., index. Edward Arnold, London. 1920. 9½ x 6½ inches.

It seems somewhat surprising that over a century and a quarter should elapse after the death of De Saussure before his life was made the subject of an adequate biography. The name of De Saussure is intimately associated with two of the mightiest of the many intellectual and spiritual movements that had their origins during the closing years of the eighteenth century. One of these was that awakening love of nature and of mountains to which the romanticists gave expression in literature and in art and which has placed mountaineering in the foremost place not only among athletic sports but among recreations of the human spirit. The other was a movement in the realm of science away from the excessive theorizing and deductive reasoning that characterized eighteenth-century thought. It was a movement leading towards the work of men like Humboldt and Darwin, who founded their theories upon close observation of a multitude of facts. Humboldt was inspired to imitate the method of De Saussure whom he regarded as his master, and it "was the perusal of Humboldt's works which awoke in the young Charles Darwin the passion for travel and discovery" (p. 440).

At last justice has been done to the memory of De Saussure in the ample biography before us. By availing himself of the results of recent researches made by Mr. Henry F. Montagnier in the libraries and private archives of Geneva, Mr. Freshfield found at his disposal a wealth of hitherto unpublished material on De Saussure's career. The information obtained from these sources was supplemented by wide studies of the Genevan professor's scientific, literary, and political contemporaries, and the whole account is delightfully presented in a dignified and restrained, but vivid, English style. Indeed the book does far more than tell us of De Saussure. It introduces us to the leading figures of a critical period in the development of science and of mountaineering and gives us an intimate view of normal life in a refined intellectual and social circle of French-speaking Europe on the threshold of the French Revolution. By no means the least important part of Mr. Freshfield's biography are the pages devoted to Genevan politics during the last years of independence, the menace of the ideas that led to the great revolution in France, the final absorption of Geneva by France, and De Saussure's connection with these events.

De Saussure's fame, however, rests primarily upon his Alpine expeditions and upon researches in geology and meteorology. An illuminating chapter on the beginnings of interest in mountains and mountaineering enables us to estimate the importance of De Saussure's work in this respect. The claim has often been made that to Rousseau should be attributed the credit of arousing the mountaineering enthusiasm and appreciation of mountain landscapes that have become so characteristic of modern life. This claim Mr. Freshfield believes to be essentially false: Rousseau, who never even climbed a mountain and least of all ventured into regions of glacier and *névé*, was a lover and interpreter of the more placid scenery of lowland and foothill. If to any one individual belongs the